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(54) **Shield for modular electrical connector**

Abschirmung für modularer elektrischer Verbinder

Blindage pour connecteur électrique modulaire

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(56) References cited:
EP-A- 0 524 426 **US-A- 5 397 246**
US-A- 5 496 195 **ZA-A- 9 503 591**

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Description

[0001] The present invention relates to a shield assembly according to the preamble of claim 1.

Background of the Invention

[0002] A variety of shield assemblies for at least partially surrounding electrical connectors are known for use with telecommunications equipment in order to reduce RFI (radio frequency interference) and EMI (electromagnetic interference). Prior shield assemblies have included metal housings that only partially enclose the connector as well as multi-part metal housings which were complicated to manufacture as well as assemble in the field. A shield assembly of this type and defining the preamble of claim 1 is disclosed in EP-A-0 524 426. As the number of parts increases, it becomes more difficult to assemble in the field and is more likely that separations between the parts will occur and degrade the performance. Certain prior shield assemblies specifically designed for printed circuit board (PCB) connectors have comprised one-piece foldable metal housings which substantially enclose the PCB connector. However, when a shield assembly is to be used on a modular connector to which an electrical cable is terminated at a rear end, it is necessary to allow access for the cable to the rear end of the connector and to include an integral grounding clip which can be crimped to a foil shield layer provided on the electrical cable to provide continuous common grounding. The cost of manufacturing the stamped and formed metal shield housing and ease of assembly in the field are significant factors when making a shield housing including an integrally formed grounding clip that substantially fully encloses a modular connector and will prevent the various walls of the shield housing from separating and degrading the shielding effect. Therefore, improvement in the field of providing shield assemblies for modular connectors that substantially enclose the connector and include a grounding clip is required.

Summary of the Invention

[0003] It is, therefore, an object of the present invention to provide an improved shield assembly for a modular electrical connector, which is simple to securely assemble in the field.

[0004] According to the invention, this problem is solved by the features defined in the characterizing portion of claim 1.

[0005] In general, an improved shield assembly for a modular connector includes a one-piece metal housing having a front wall, a base, and a pair of opposing sidewalls, each one of said sidewalls being situated along a lateral edge of the base between the front wall and an opened rear end of the shield assembly, a top wall hingedly connected to the front wall and movable from

an open position to an enclosed position, including an integral grounding clip extending from a rearward distal end of the top wall, and a rear wall section extending from a rear end of at least one opposing sidewall and foldable into a closed position behind an inserted connector. The integrity of the shield enclosure can be enhanced by including a cable support bar disposed perpendicularly away from the rear wall section so that upon folding of the rear wall section into the closed position the support bar is positioned adjacent a terminated cable.

Brief Description of the Drawings

[0006]

FIG. 1 is a front perspective view of a terminated shielded modular connector of the present invention;

FIG. 2 is a rear perspective view of the terminated shielded modular connector of FIG. 1;

FIG. 3 is an exploded view of the shielded modular connector of FIG. 1;

FIG. 4 is a partially assembled view of the shielded modular connector of FIG. 1;

FIG. 5 is a rear perspective view of a modular connector partially assembled to the shield housing;

FIG. 6 is a partial rear view of a terminated modular connector being assembled to the shield housing;

FIG. 7 is a partial rear view of a terminated modular connector being assembled to the shield housing;

FIG. 8 is a partial rear view of a terminated modular connector being assembled to the shield housing;

FIG. 9 is a partial rear view of a terminated modular connector being assembled to the shield housing; and

FIG. 10 is a side view of the shielded modular connector latchingly engaged to a faceplate.

Description of the Preferred Embodiment

[0007] A shield assembly embodying the concept of the present invention is designated generally by the reference numeral 10 in the accompanying drawings. As can be seen in FIGS. 1 and 2, shield assembly 10 is a one-piece stamped and formed housing that substantially surrounds a modular electrical connector 12 which has terminated an electrical cable 14 to provide RFI and EMI shielding. As best seen in FIGS. 3 and 4, shield housing 10 is integrally formed to have a front wall 30 with an opening configured to surround a plug receiving opening 18 of an electrical connector 12, a base wall 38 and a pair of opposing side walls 40 positioned on the lateral edges of base 38 between the front wall 30 and the opened rear end of the shield assembly 10 and having upper extensions 42. The front wall 30 of the shield housing includes a pair of wiping tabs 32 which extend to the plug receiving opening 18 of the connector in or-

der to create a continuous ground with the mated plug (not shown). Shield housing 10 further includes a hingedly connected top wall 34 having opposing side walls 36 and a frontwall 48 that includes a grounding clip 50 having a pair of crimp tabs 52 at the end of a clip arm 54 extending from the rearward distal end of top wall 34 for engagement with a foil shield sheath 60 of the electrical cable 14 that has been terminated to the modular connector 12. The top wall 34 is movable from an open position to an enclosed position in which grounding clip 50 is bent down adjacent cable 14. The crimping of grounding clip 50 to the foil shield sheath 60 provides continuous common grounding. Shield housing 10 also includes front and rear latch openings 66,68 that correspond to latching areas on the modular connector 12 for latching the connector to a communication box (not shown) or other assembly. Similarly, shield housing 10 includes top and bottom latch openings 62,64 which provides access to the means on connector 12 for mounting to latches 74, 76 and 78 on a panel or faceplate as shown in FIG. 10.

[0008] As best seen in FIG. 3, a standard modular electrical connector has a front end 16 that includes a plug receiving opening 18, a top 20, a pair of opposing sides 24, and a rear end 26 at which an electrical cable 14 is terminated. The modular connector utilized with the present invention terminates the cable 14 by a termination cap 28.

[0009] As best seen in FIG. 4, shield assembly 10 is preformed into a box-like housing assembly that has a rear opening which in conjunction with the hingedly connected top wall 34 allows for the insertion of modular connector 12 such that the plug receiving opening 18 of connector 12 will correspond to an opening in the front shield wall 30.

[0010] The method of securing the shield housing 10 to a modular connector 12 is best shown in FIGS. 5-9. FIG. 5 shows the connector 12 inserted into the open rear end of shield housing 10 until the front end 16 of connector 12 abuts front wall 30 of shield 10. After the modular connector 12 has been inserted within the shield housing 10, the rear wall sections 44,46 are folded over the rear end 26 of the modular connector 12. Rear wall section 44 includes a cable support bar 58 which is disposed perpendicularly away from rear wall section 44 and situated such that the folding over of rear wall section 44 behind the inserted connector 12 positions support bar 58 adjacently underneath the terminated cable 14. The grounding clip 50 is then folded down adjacent the foil shield sheath 60 of the electrical cable 14 and crimped around the cable and the cable support bar 58. Finally, a crimp ring 56 is inserted around the grounding clip 50 and crimp tabs 52 and crimped thereto. The engagement of the grounding clip 50 to the electrical cable 14 closes the top wall 34 and secures the top wall 34 in an enclosed position around the connector 12. Thus it is seen that in the field the installer merely needs to insert the connector 12 fold over the

rear walls to secure the connector within and bring down the grounding clip 50 and crimp it to the cable 14 to securely enclose shield housing 10 around connector 12. The support bar 58 enhances the integrity of the enclosed shield housing 10 by adding protection from the top wall 34 pulling away from the connector 12.

[0011] As can be seen in FIG. 10, shield housing 10 also includes an angled top wall portion 70 extending from the front of the top latch opening 62 downward towards the rear end such that when shielded electrical connectors 12 are mounted to panels such as faceplates 72 in which multiple connectors are mounted on top of each other, the angled surface 70 allows for easier insertion and removal of adjacent shielded connectors 12, as well as providing access to the latch 74, 76 by a screwdriver or other prying device (not shown).

Claims

1. A shield assembly for surrounding a modular connector (12) comprising:

a one piece metal housing (10) having a front wall (30) a base (38) and a pair of opposing side walls (40), each one of said side walls being situated along a lateral edge of the base (38) between the front wall (30) and the opened rear end of the shield assembly;
a top wall (34); and
a rearwall section (44, 46), foldable into a closed position;

characterized in that

the top wall (34) is hingedly connected to the front wall (30) and movable from an open position to a closed position and includes an integral grounding clip (50) extending from a rearward distal end of the top wall (34); and
the rear wall section (44, 46) extends from a rear end of at least one opposing side wall.

2. A shield assembly according to claim 1, wherein the rear wall section (44, 46) includes a cable support bar (58) disposed away from the rear wall section so that upon folding of the rear wall section into the closed position the support bar is positioned adjacent to a terminated cable (14).
3. A shield assembly according to claim 1, wherein each of the pair of opposing sidewalls (40) includes an inset wall portion (42) at a top end thereof, and the top wall (34) includes a complementary pair of complementary flanges (36) which matingly nest with the inset wall portions when the top wall is moved into the enclosed position.

4. A shield assembly according to claim 1, wherein the top wall (34) includes a rear flange extending a sufficient lengths to partially cover the folded rear wall section (44, 46) 5
5. A shield assembly according to claim 1, wherein the top wall (34) includes a latch opening (62) for allowing a latch (74) to secure the shielded connector (12) to a panel, wherein the top wall (34) further includes a sloped portion (70) angled downwardly towards the rear end, that provides access to the latch from the rear end. 10
6. A shield assembly according to claim 5, wherein the sloped portion (70) extends from a front side of the shield opening (62). 15
7. A method of making a shielded modular connector comprising the steps of: 20
 - providing a modular connector (12) with a front end including a plug receiving opening (18) and cable termination means at a rear end;
 - providing a one-piece foldable metal housing (10) having a front wall (30) for covering the front end of the connector (10) around the plug receiving opening (18), a top wall (34), a bottom wall (38), a pair of opposing side walls (40) including a foldable rear wall section (44, 46), extending from a rear end of at least one opposing sidewall, and an open rear end; wherein the top wall (34) is hingedly connected to the front wall (30) and includes a grounding clip (50) extending from a rearward distal end of the top wall (34); 25
 - inserting the connector (12) into the shield housing (10) through an open rear end;
 - folding the rear wall section (44, 46) around the rear of the connector; 30
 - bending the grounding clip (50) onto the cable (14); and 40
 - crimping the grounding clip (50) around the cable. 45
8. A method of making a shielded modular connector according to claim 7, wherein the foldable rear end wall section (44, 46) includes a cable support wall (58) disposed perpendicularly away from the rear wall section such that upon folding the rear wall section around the rear of the connector (12) the cable (14); and wherein the step of crimping the grounding clip around the cable includes crimping the grounding clip around the support bar. 50

Patentansprüche

1. Abschirmanordnung zum Umgeben eines modula-

ren Steckverbinders (12), bestehend aus:

einem einstückigen Metallgehäuse (10) mit einer Vorderwand (30), einem Boden (38) und zwei gegenüberliegenden Seitenwänden (40), von denen jede Seitenwand längs eines Seitenrandes des Bodens (38) zwischen der Vorderwand (30) und dem offenen hinteren Ende der Abschirmanordnung liegt, einer oberen Wand (34), und einem Hinterwandabschnitt (44, 46), der in eine geschlossene Position klappbar ist,

dadurch gekennzeichnet, daß,

die obere Wand (34) mit der Vorderwand (30) schwenkbar verbunden und aus einer offenen Position in eine geschlossene Position verstellbar ist und eine integrale Erdungsklammer (50) aufweist, die sich von einem hinteren distalen Ende der oberen Wand (34) aus erstreckt, und der Hinterwandabschnitt (44, 46) von einem hinteren Ende wenigstens einer gegenüberliegenden Seitenwand ausgeht.

2. Abschirmanordnung nach Anspruch 1, bei der der Hinterwandabschnitt (44, 46) eine Kabeltragschiene (58) aufweist, die vom Hinterwandabschnitt entfernt so angeordnet ist, daß beim Klappen des Hinterwandabschnitts in die geschlossene Position die Tragschiene nahe einem angeschlossenen Kabel (14) positioniert ist.
3. Abschirmanordnung nach Anspruch 1, bei der jede der beiden gegenüberliegenden Seitenwände (40) einen Anschlagwandabschnitt (42) am oberen Ende davon aufweist, und die obere Wand (34) ein komplementäres Paar komplementärer Flansche (36) hat, die in die Anschlagwandabschnitte passend eingreifen, wenn die obere Wand in die geschlossene Position verstellt wird.
4. Abschirmanordnung nach Anspruch 1, bei der die obere Wand (34) einen hinteren Flansch ausreichender Länge hat, um den geklappten Hinterwandabschnitt (44, 46) teilweise abzudecken.
5. Abschirmanordnung nach Anspruch 1, bei der die obere Wand (34) eine Rastöffnung (62) hat, damit eine Klinke (74) den abgeschirmten Steckverbinder (12) an einem Paneel befestigen kann, wobei die obere Wand (34) außerdem einen schrägen Abschnitt (70) aufweist, der zum hinteren Ende nach unten geneigt ist, so daß der Klinke vom hinteren Ende her ein Zugriff ermöglicht wird.
6. Abschirmanordnung nach Anspruch 5, bei der der schräge Abschnitt (70) von der Vorderseite der Ra-

stöffnung (62) ausgeht.

7. Verfahren zur Herstellung eines abgeschirmten modularen Steckverbinders, umfassend die folgenden Schritte:

Vorsehen eines modularen Steckverbinders (12) mit einem vorderen Ende, das eine Steckeraufnahmeöffnung (18) und eine Kabelanschlußeinrichtung am hinteren Ende hat, Vorsehen eines einstückigen, klappbaren Metallgehäuses (10) mit einer Vorderwand (30) zum Abdecken des vorderen Endes des Steckverbinders (10) um die Steckeraufnahmeöffnung (18), einer oberen Wand (34), einem Boden (38), zwei gegenüberliegenden Seitenwänden (40) mit einem klappbaren Hinterwandabschnitt (44, 46), der vom hinteren Ende wenigstens einer gegenüberliegenden Seitenwand ausgeht, und einem offenen hinteren Ende, wobei die obere Wand (34) mit der Vorderwand (30) schwenkbar verbunden ist und eine Erdungsklammer (50) aufweist, die vom hinteren distalen Ende der oberen Wand (34) ausgeht, Einsetzen des Steckverbinders (12) in das Abschirmgehäuse (10) durch das offene hintere Ende, Klappen des Hinterwandabschnitts (44, 46) um das hintere Ende des Steckverbinders, Biegen der Erdungsklammer (50) auf das Kabel (14), und Festklemmen der Erdungsklammer (50) um das Kabel.

8. Verfahren zum Herstellen eines abgeschirmten modularen Steckverbinders nach Anspruch 7, bei dem der klappbare Hinterwandabschnitt (44, 46) eine Kabeltragstange (58) hat, die senkrecht vom Hinterwandabschnitt ausgeht, so daß beim Klappen des Hinterwandabschnitts um das hintere Ende des Steckverbinders (12) das Kabel (14) von der Kabeltragstange (58) getragen wird, und bei dem der Schritt des Festklemmens der Erdungsklammer um das Kabel das Festklemmen der Erdungsklammer um die Tragwand umfaßt.

Revendications

1. Dispositif de blindage pour entourer un connecteur modulaire (12), comprenant :

un boîtier métallique monobloc (10) ayant une paroi avant (30), une base (38) et deux parois latérales opposées (40), chacune des dites parois latérales étant située le long d'un bord latéral de la base (38) entre la paroi avant (30) et

l'extrémité arrière ouverte du dispositif de blindage ;
une paroi supérieure (34) ; et
un élément de paroi arrière (44, 46), pliable à une position fermée ;

caractérisé en ce que :

la paroi supérieure (34) est reliée de façon articulée à la paroi avant (30) et elle est déplaçable d'une position ouverte à une position fermée, et elle comporte une pince solidaire de mise à la terre (50) qui s'étend à partir d'une extrémité distale arrière de la paroi supérieure (34) ; et
l'élément de paroi arrière (44, 46) s'étend à partir d'une extrémité arrière d'au moins une des parois latérales opposées.

2. Dispositif de blindage selon la revendication 1, dans lequel l'élément de paroi arrière (44, 46) comprend une patte de support de câble (58) s'écartant de l'élément de paroi arrière de sorte que, après pliage de l'élément de paroi arrière à la position fermée, la patte de support est adjacente à un câble terminé (14).
3. Dispositif de blindage selon la revendication 1, dans lequel chacune des deux parois latérales opposées (40) présente une portion de paroi en renforcement (42) à son extrémité supérieure, et la paroi supérieure (34) comprend une paire complémentaire d'ailes complémentaires (36) qui s'accouplent en emboîtement avec les portions de paroi en renforcement lorsqu'on amène la paroi supérieure à la position fermée.
4. Dispositif de blindage selon la revendication 1, dans lequel la paroi supérieure (34) comprend une aile arrière s'étendant sur une longueur suffisante pour couvrir partiellement l'élément de paroi arrière plié (44, 46).
5. Dispositif de blindage selon la revendication 1, dans lequel la paroi supérieure (34) comporte un trou de verrouillage (62) pour permettre à un verrou (74) de fixer le connecteur blindé (12) à un panneau, et dans lequel la paroi supérieure (34) présente en outre une partie en pente (70) inclinée vers le bas et vers l'extrémité arrière, qui donne accès au verrou à partir de l'extrémité arrière.
6. Dispositif de blindage selon la revendication 5, dans lequel la partie en pente (70) s'étend à partir d'un côté avant du trou de verrouillage (62).
7. Procédé de fabrication d'un connecteur blindé modulaire, comprenant les étapes de :

préparation d'un connecteur modulaire (12) ayant une extrémité avant qui comporte une ouverture de réception de broches (18) et une extrémité arrière qui comporte un moyen de terminaison de câble ; 5

préparation d'un boîtier métallique pliable monobloc (10) ayant une paroi avant (30) pour couvrir l'extrémité avant du connecteur (10) autour de l'ouverture de réception de broches (18), une paroi supérieure (34), une paroi inférieure (38), deux parois latérales opposées (40) incluant un élément de paroi arrière pliable (44, 46) qui s'étend à partir d'une extrémité arrière d'au moins une des parois latérales opposées, et une extrémité arrière ouverte, de sorte que la paroi supérieure (34) est reliée de façon articulée à la paroi avant (30) et comporte une pince de mise à la terre (50) qui s'étend à partir d'une extrémité distale arrière de la paroi supérieure (34) ; 10 15 20

insertion du connecteur (12) dans le boîtier de blindage (10) par une extrémité arrière ouverte ;

rabattement de l'élément de paroi arrière (44, 46) autour de l'arrière du connecteur ; 25

pliage de la pince de mise à la terre (50) sur le câble (14) ; et

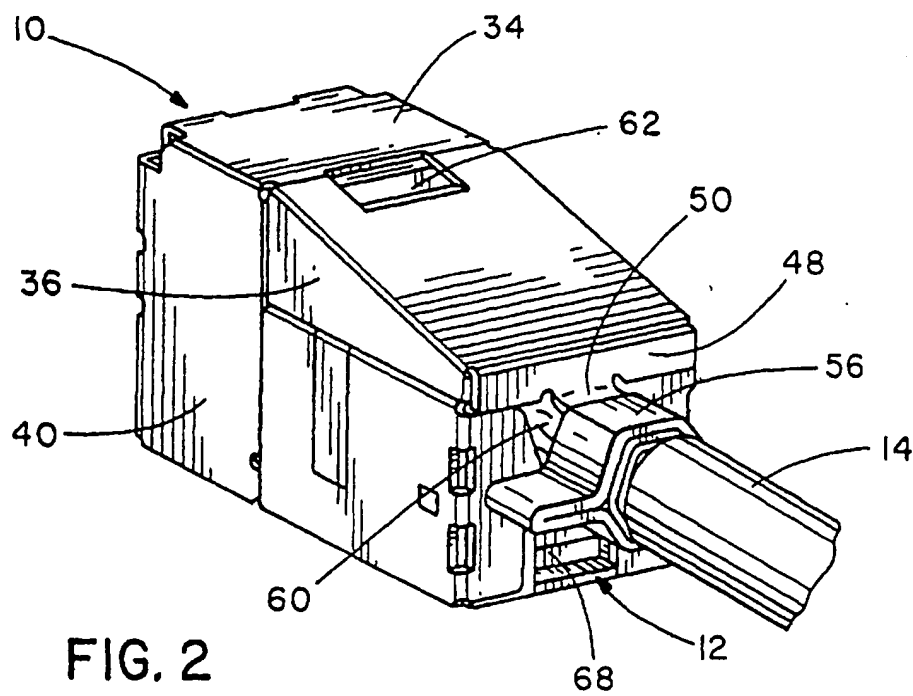
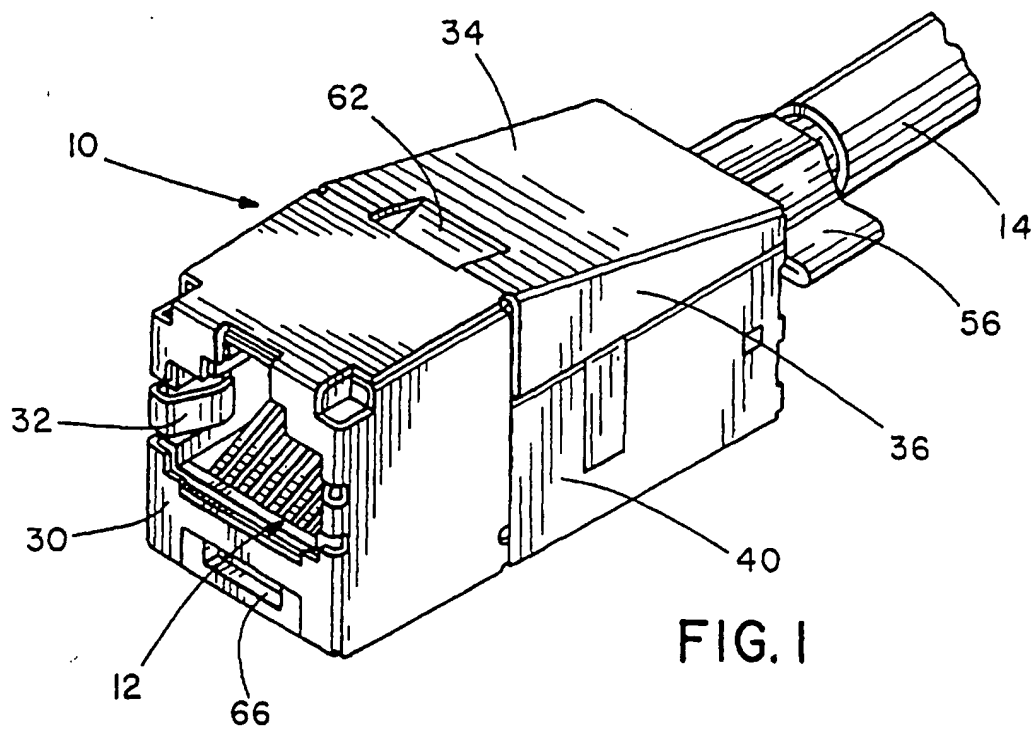
sertissage de la pince de mise à la terre (50) autour du câble. 30

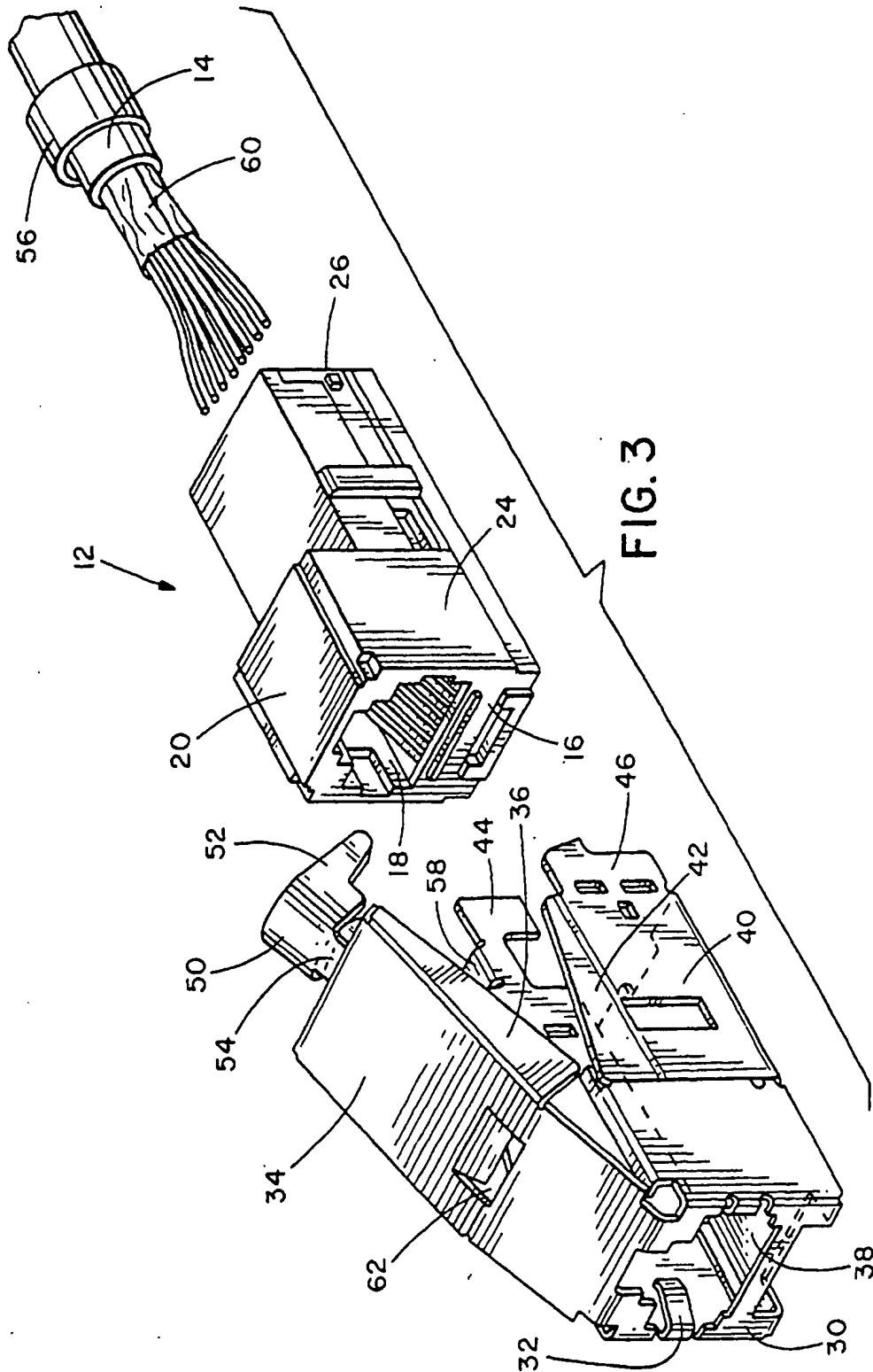
8. Procédé de fabrication d'un connecteur modulaire blindé selon la revendication 7, dans lequel l'élément de paroi d'extrémité arrière pliable (44, 46) comprend une patte de support de câble (58) disposée perpendiculairement à l'opposé de l'élément de paroi arrière de sorte que, après pliage de l'élément de paroi arrière autour de l'arrière du connecteur (12), le câble (14) est supporté par la dite patte ; et dans lequel l'étape de sertissage de la pince de mise à la terre autour du câble comprend le sertissage de la pince de mise à la terre autour de la patte de support. 35 40

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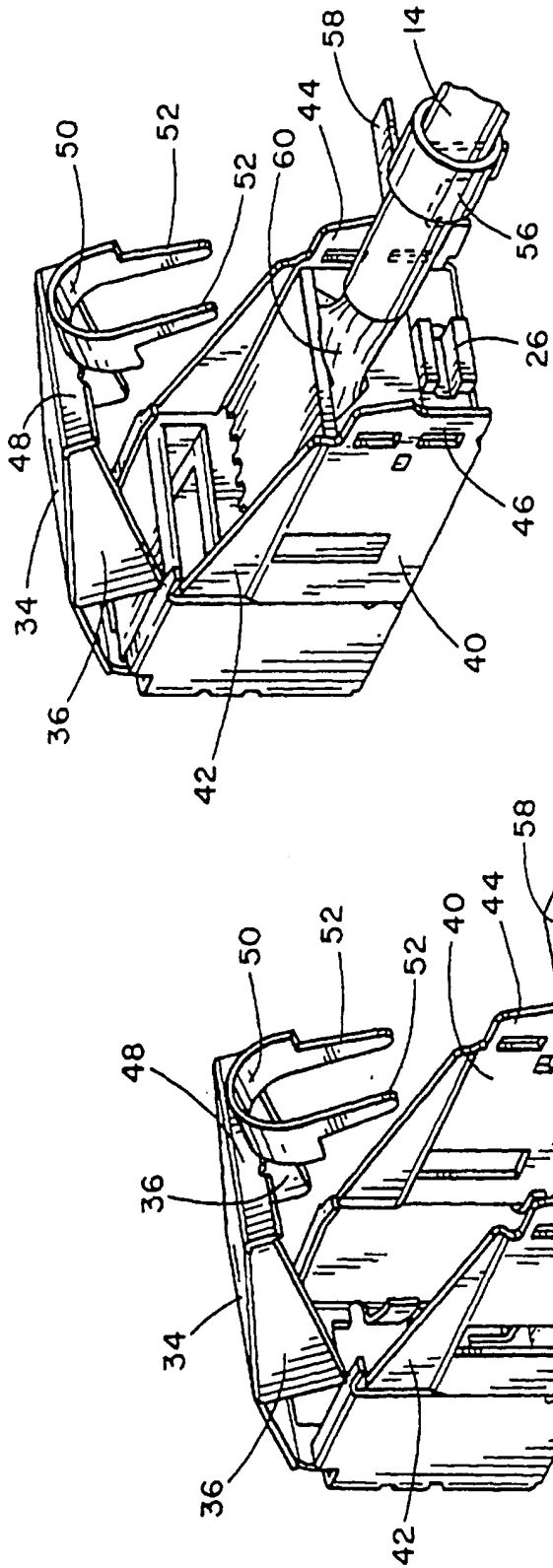


FIG. 5

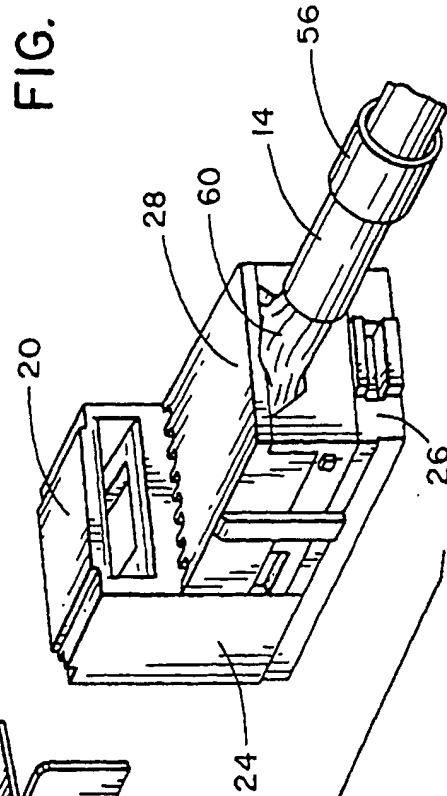
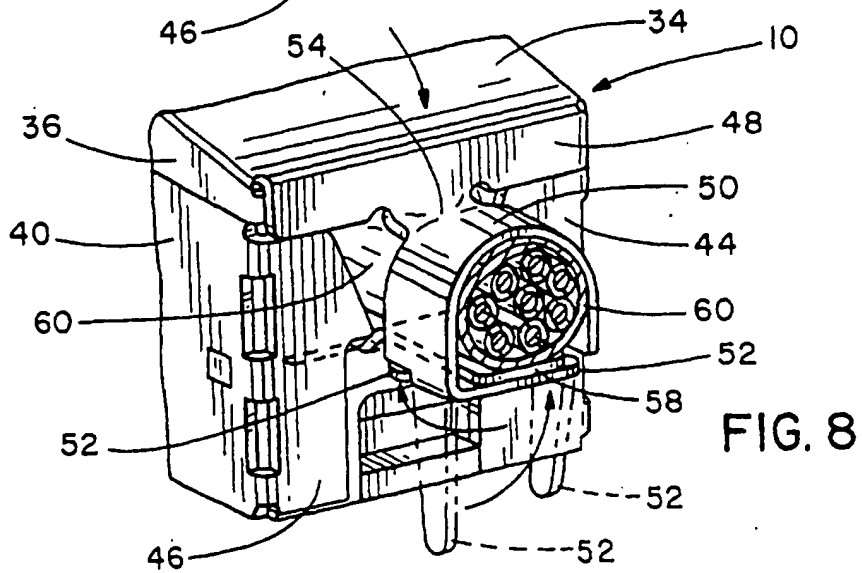
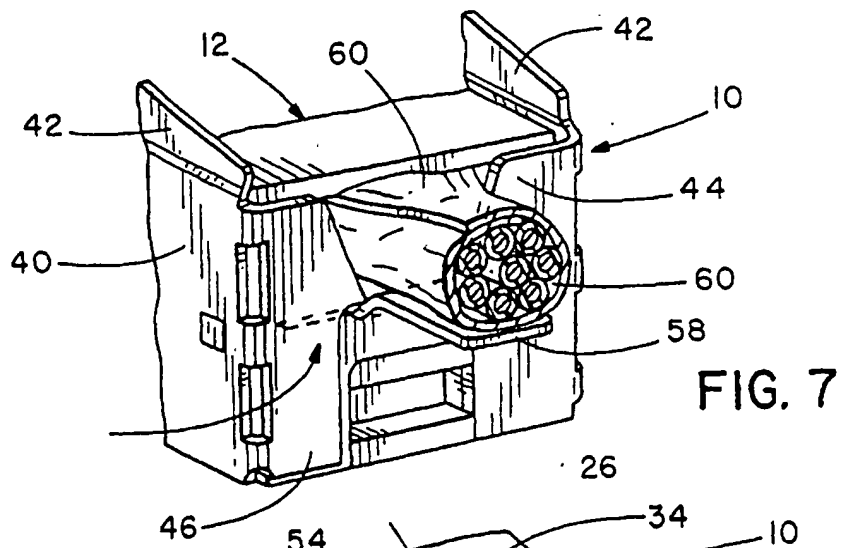
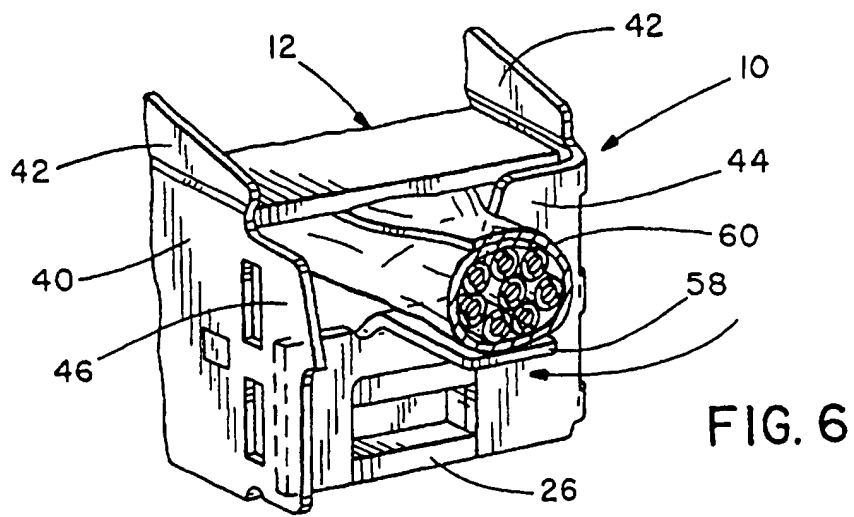
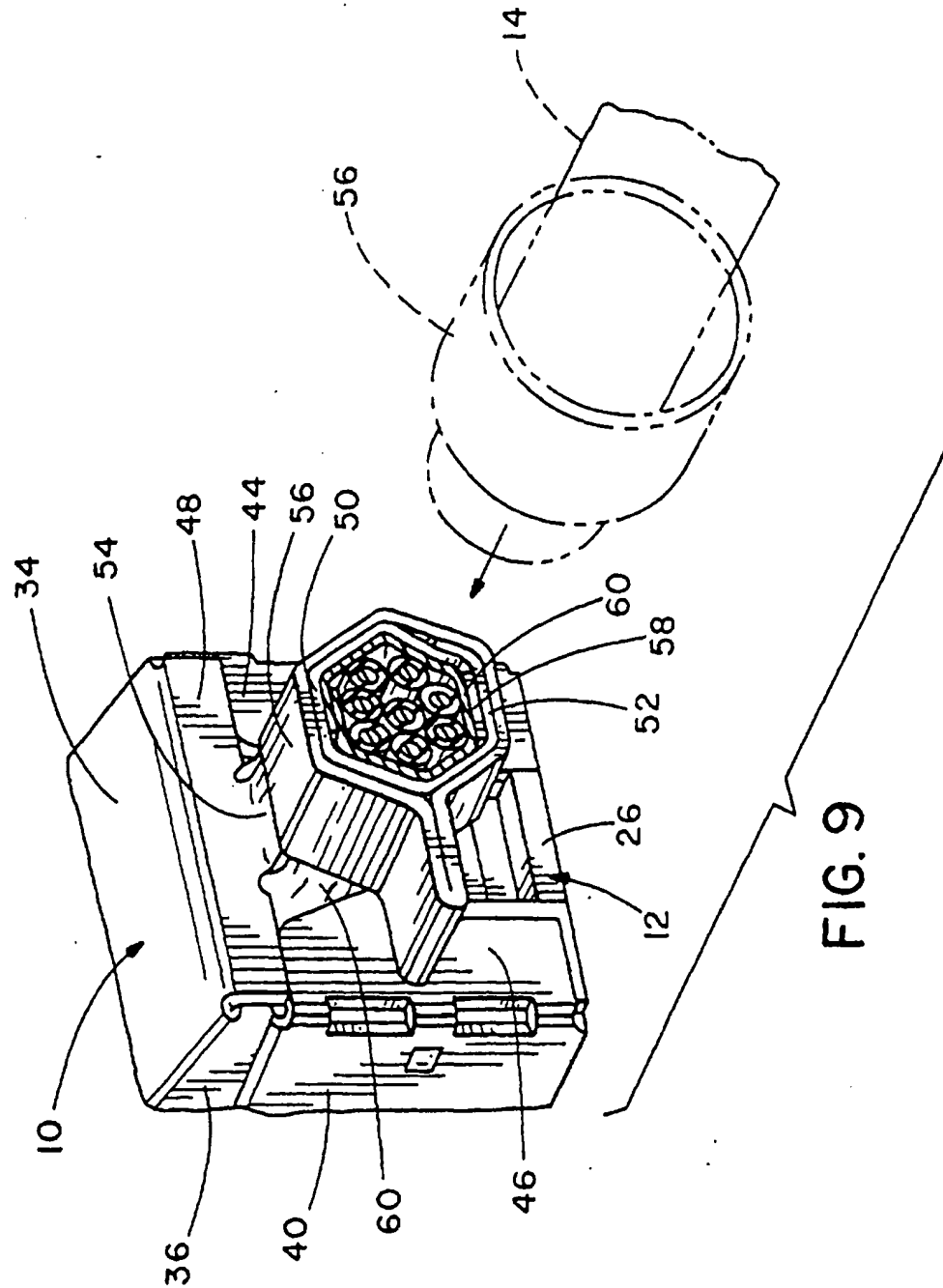


FIG. 4





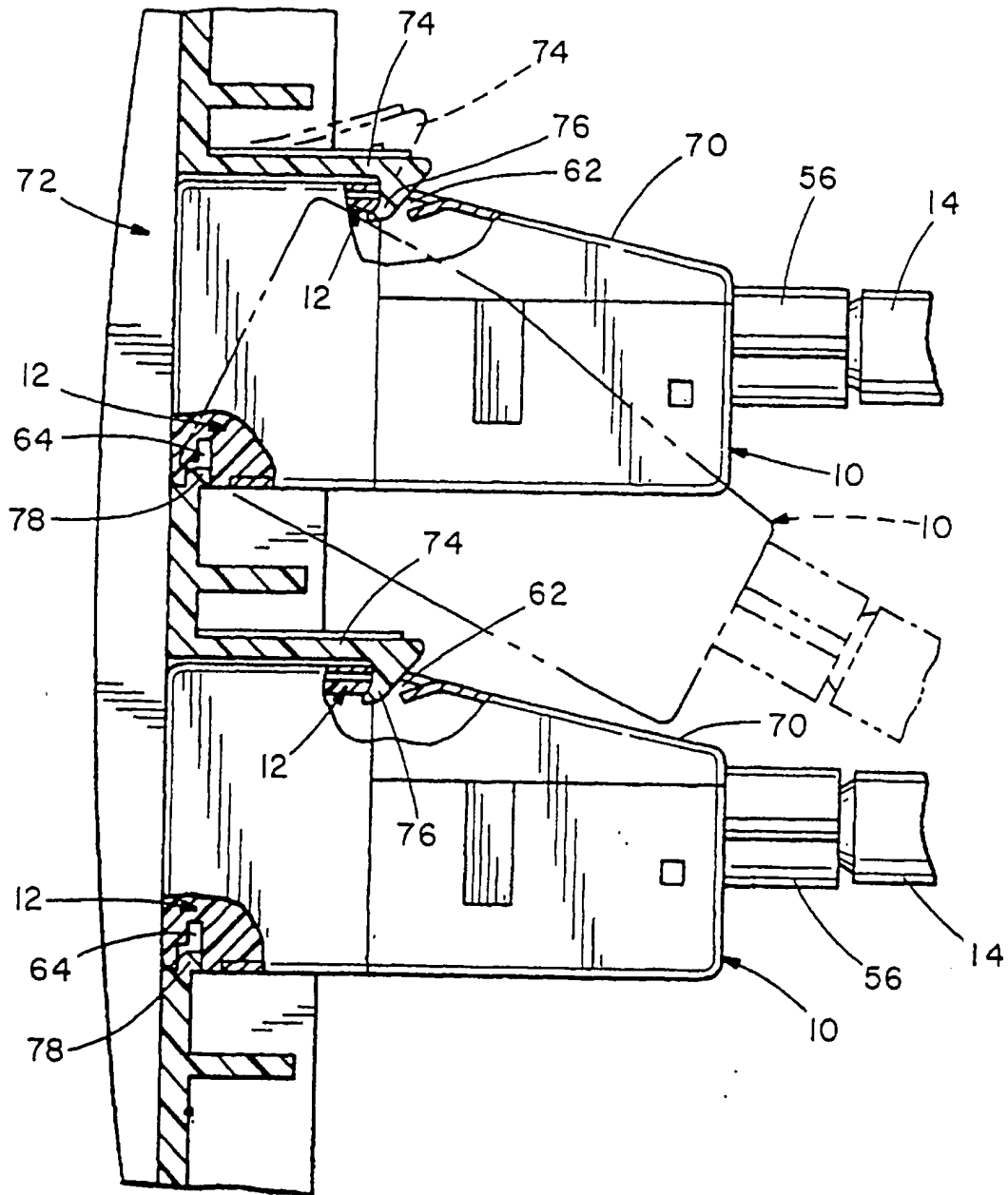


FIG. 10